Refining Risk-Adjustment of 90-day Costs Following Surgical Fixation of Ankle Fractures - Implications for a Bundled Payment Model

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Introduction

As the current healthcare model transitions from fee-for-service to value-based payments, identifying cost-drivers of 90-day payments following surgical procedures will be a key factor in risk-adjusting prospective bundled payments and ensuring success of these alternative payment models.

Objectives

- To identify **patient-level**, **procedure-level** and **state-level factors** associated with significant cost-variation in a 90-day episode of care following open reduction and internal fixation (ORIF) of isolated ankle fractures.

Methods

- 2005-2014 5% Medicare Standard Analytical Files**
- Patients undergoing ORIF for isolated **uni-malleolar**, **bi-malleolar** and **tri-malleolar** ankle fractures.
- Generalized multivariate linear regression model to identify significant factors influencing 90-day costs while controlling for other co-variables.

Results

- A total of 6,499 patients were included in the study.
- The **risk-adjusted 90-day cost** of a **female** patient, **aged 65-69 years**, undergoing **outpatient** ORIF for a **closed uni-malleolar** ankle fracture in **Michigan** was **\$6,949 ± \$1,060**.
- The highest marginal cost-impacts for age (in decreasing order of effect):
 - ≥85 years** (**+\$2,568**; p<0.001),
 - 80-84 years** (**+\$1,994**; p=0.002)
 - <65 years** (**+\$1,967**; p<0.001)
 - 75-79** (**+\$1,869**; p=0.002)
 - 70-74 years** (**+\$1,761**; p=0.001)

Table 1: Marginal impact of procedural-level factors on 90-day costs after controlling for age, gender, co-morbidities and state.

Procedure-Level Factor	Number (%)	Reimbursement Adjustment (+/-)	P-value
Location of Surgery Inpatient Outpatient	4,724 (72.7%)	+ \$5,577 ± \$410	<0.001
	1,775 (27.3%)	Ref.	-
Fracture Morphology Uni-malleolar Bi-malleolar Tri-malleolar	1,417 (21.8%)	Ref.	-
	3,130 (48.2%)	+ \$437 ± \$464	0.346
	1,952 (30.0%)	+ \$1,082 ± \$498	0.030
Type of Fracture Open Closed	984 (15.1%)	+ \$911 ± \$497	0.067
	5,515 (84.9%)	Ref	
Use of Ankle Arthroscopy	<11 (<0.2%)	+ \$2,683 ± 4,470	0.548
Syndesmotic Injury/Fixation	611 (9.4%)	+ \$2,822 ± \$607	<0.001

Co-morbidities associated with higher 90-day cost

- chronic kidney disease (+\$8,897)
- malnutrition (+\$7,908)
- obesity (+\$5,362)
- cerebrovascular disease/stroke (+\$4,159)
- anemia (+\$3,087)
- congestive heart failure (+\$2,395)
- COPD (+\$1,932)
- diabetes mellitus (+\$1,243)
- ischemic heart disease (+\$1,261)

State-level variation in 90-day Costs

- Nevada (+\$6,371)
- Massachusetts (+\$4,497)
- Oklahoma (+\$4,002)
- New Jersey (+\$3,802)
- Maryland (+\$3,043)
- Texas (+\$2,556)
- Idaho (-\$6,025)
- Wisconsin (-\$3,061)

Conclusion

There will be a need of prior risk-adjustment of prospective payment models to ensure that providers catering to complex ankle fractures are appropriately reimbursed to prevent the creation of financial disincentives and barriers of access to care in our healthcare system.